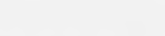
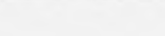
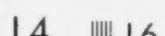


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Trade Guilds for Research and the Proposed National Research Institute for Canada

BY

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Administrative Chairman of the Research Council of Canada

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Trade Guilds for Research and the Proposed National Research Institute for Canada*

By A. B. MACALLUM, Sc.D., F.R.S.,

Administrative Chairman of the Research Council of Canada.

THE cardinal aim of the Council is to aid the industries of the Dominion to develop and make headway in the keen competition which is now facing them. The most effective way to do this is to get them to apply the most advanced scientific methods to their production and scientific research to the problems which they encounter in their efforts to increase their output, to improve its character or to cheapen manufacture. This entails considerable expense which few of the firms individually can meet. It may be easy for a firm with a turn-over of several millions to provide annually fifty thousand dollars and upward for research, but when the value of the output is much less, for example—a few hundred thousands of dollars, to set aside annually a sum for research that would give results of value would be beyond its power. It would require an adequately equipped laboratory involving a considerable initial outlay, and the expenditure for salaries would be large. The vast majority of the Canadian industrial firms are in this class, and it would, consequently, be futile to expect each of them to institute research laboratories with a staff adequately trained to deal with their problems. How their needs in this line should be met was carefully considered by the Council, and a solution proposed which was first advanced by the British Research Council.

In Great Britain the same problem presented itself and with greater urgency, for the ability of the nation to carry its present gigantic burden of debt depends on its industries successfully meeting a world-wide competition. It was finally decided to encourage the formation of Trade Associations for Research in the firms in each line of industry, each of which would annually contribute, on an agreed basis, to a common fund to be expended for research on the problems in that industry. In cases where the total amounts thus available were insufficient, it was supplemented by grants from a fund of £1,000,000 under the control of the Department of Scientific and Industrial Research. Already about thirty-four lines of industry have formed Trade Associations for Research, and a majority of these are already functioning. It is believed these Trade Associations will result in revolutionizing methods in the various lines in which they have been formed and will enable British industry eventually to maintain a foremost place for its products in the markets of the world.

This system of Trade Associations, with modifications arrived at after careful consideration of Canadian industrial needs and conditions, has been adopted by the

* Extract from address delivered by Dr. A. B. Macallum, to the Toronto Branch of the Society of Chemical Industry.—*January 23rd, 1919.*

Research Council of Canada. There are about a dozen lines of industry in which what are to be called Trade Guilds for Research may be formed, and amongst them may be mentioned the Tanning, the Textile, the Pulp and Paper, the Fisheries, the Furniture, the Rubber, the Iron and Steel, and the Clay Products Industries. These all are important to the industrial development of Canada, and if the firms in each of these could be brought to co-operate for research on their special problems, the result would be greatly to their advantage in their struggle to win against outside competition. Unfortunately the number of firms in any particular industry are fewer and, with some exceptions, of smaller capital and output than those in Great Britain, and consequently the funds which they may pool for research cannot be of a magnitude to compare with the funds at the disposal of the British Trade Associations. It must also be recognized that public opinion is not yet such as to sanction direct public aid to supplement the funds of a Guild as is the case in some of the British Trade Associations. The latter are, in the majority of cases at least, to provide and maintain their own laboratories. If the Guilds for Research could be given free accommodation, light and heat and, where necessary, motive power, in some Central Research Institute, their funds could therefore be expended for their research problems alone, not by any means a small advantage. If, further, all the Guilds having problems more or less related were similarly aided, their association in a Central Research Institute would promote the success of such Guilds and they would have the advantage of the supervision of the staff of the Institute composed, as it ought to be, of a number of very highly expert specialists in research in the various fields of pure and applied science.

The formation and the successful working of such Guilds in Canadian industries, therefore, depends on the establishment of a National Research Institute. Through such Guilds only can the Canadian industries as a whole be assisted to meet the needs in scientific research which the conditions of to-day impose on them. The question therefore of founding a National Research Institute is from this point of view an urgent one, and it is so regarded by the Research Council which has recommended the establishment of such an Institute.

There are other reasons also which have contributed to this action by the Council. There ought to be a central organization amply equipped to undertake research on general problems affecting the utilization of our natural resources and on general problems affecting the industries generally. The need for such is recognized elsewhere and in some cases it has been met by the foundation of Institutes whose work has been of immense service to industry. Germany has two of such, one for physical standards and research at Charlottenburg, the other for chemical research at Dahlem. For Great Britain there is the National Physical Laboratory at Teddington which concerns itself with researches along all technical lines, except the chemical. The Bureau of Standards at Washington, as its name implies, deals with standards of all sorts: physical, chemical, electrical, metallurgical and even industrial, but it also undertakes research problems for the industries. It has in the seventeen years of its existence given splendid service in these lines to the nation.

A National Research Institute is now being established in Japan, and already a fund of \$2,600,000 has been collected for it, more than half of which has been

contributed by the Diet, and the Emperor personally. It is expected that the fund will eventually amount to \$4,000,000. The functions of this Institute will be those of a Bureau of Standards and a Mellon Institute, but research on the industrial side will be specially provided for. A proposal made by the French Academy of Sciences for the establishment of a National Research Institute for France is now under consideration, and the present indications are that as soon as Peace is established such an Institute will be brought into existence. The Australian Advisory Council of Science and Industry has recommended to the Government of the Commonwealth the foundation of an Institute of Science and Industry which will carry on work and researches in standardization of scientific apparatus, of electric lamps, apparatus and machinery, of instruments of precision used in industry and of materials used in industry and by the Commonwealth and State Governments of Australia. It will, as recommended, also undertake research work in forestry, mining, metallurgy, and on the processes and methods concerned in the manufacturing industries with the view of aiding the development of the latter.

The fact that a number of such Institutes are in being and operation elsewhere and that the establishment of others are under contemplation brings strong support to the recommendation of the Research Council that a National Research Institute for Canada should be established. There is no such organization as yet in Canada which fulfils more than a small fraction of the functions of such an Institute. The needs of the Dominion in this respect are urgent. The position of our industries in the face of keen, incessant competition from abroad cannot be ignored and the utmost resources of science must be brought to their assistance. To do all this a great organization must be brought into existence, one of whose functions will be the initiation and conduct of researches on basic problems affecting the industries. That organization would centre in the management and staff of the proposed Institute which would be centrally situated, at Ottawa for example, possibly eventually with branches at points in the Dominion where special local needs require the establishment of such.

Associated with this function of investigating the basic problems of the industries must be that of superintending and guiding the researches on the various problems in which the Guilds for Research formed in the various lines of industry are concerned. This would necessitate, except in very special cases, the accommodation of the research staffs of such Guilds in the buildings of the Institute. Such a close association for research of the various industries, some of whose individual problems would be allied or closely related, would enhance the chances of success in attaining the object of all the Guilds. The very fact that the research staffs of these would be constantly under the supervision of the staff of the Institute, composed as it ought to be of the most highly qualified experts that can be found, would promote the formation and maintenance of such Guilds in all the lines of industry which would profit by the application of research to their problems. The industries of Canada would thus, it is safe to say, be assisted to a degree out of all proportion to what they would expend or to the cost of the maintenance of such an Institute.

There are firms in the industries which because of the large capital they possess and their receipts are able to undertake their own research work and, therefore, do not require any assistance such as is proposed. The number of such may increase as the years pass, and therefore private initiation and enterprise in research will always be cultivated, as it has been in the past, with excellent results. If, however, only such firms were in a position to apply research to further their development, the result would be the disappearance of the smaller firms either by absorption into the larger or by extinction, for the larger firms would, through the results of research, be put in a position to control, and would control, all the valuable processes of manufacture through patenting their discoveries. This undesirable result is beginning to be exemplified today in the United States. One firm, by way of illustration, which spends half a million dollars annually for research, controls consequently a very large number of patents, the exclusive use of which by it prevents competition and tends to give it a monopoly of the market not only of the United States but of the world. To enable the smaller firms in an industry to live, and, better, to succeed in efforts to do more than hold their own in keen competition, Guilds for Research must be established for them, fostered and guided as they would be according to the scheme of the proposed National Research Institute.

The Research Institute should have also other functions than those already described. It should concern itself with standards of all sorts, but more particularly those which are immediately related to our technical and industrial needs. They should embrace those of heat measurements of all kinds, electricity, magnetism, optics, chemistry, and the materials used in engineering construction. It should conduct investigation on metals, alloys, foods, paper, oils, rubber, bituminous materials, lubricants, textiles, leather, paints, etc. It should also be a testing house for all instruments of precision used either in the service of the Government or of the industries. These functions should be provided for in the equipment of the Institute at the outset, although not on a scale that would be required a few years later. The beginnings along this line must not be too ambitious but yet should be sufficient for our present needs.

What the ultimate development of the proposed Institute's activities along this line may be, may be gathered from the scope of the work undertaken by the Bureau of Standards at Washington.

The proposed Institute should be under the control of a Director whose qualifications and experience must be such as to fit him for this very responsible position. The staff should include a number of highly qualified research men of special initiative and originality, to direct the work of their special departments and associated with them should be a number of investigators specially selected because of their training and ability to conduct productive research along special lines. The salaries for the members of the staff in their various grades should be such as to secure the very best appointments.

It is recommended that the proposed Research Institute be established at or near Ottawa, on a site of at least fifty acres in area and within reach of the city water, gas and electric power supply. The building should be of the laboratory type, of solid construction with cement floors, four stories in height in addition to a basement,

and of dimensions 200 x 60 x 70 feet, in which besides corridors and office administration quarters there would be at least fifty laboratory rooms. The Council has recommended that an appropriation of \$500,000 be made for the building, one of \$100,000 for its scientific equipment, and one of \$100,000 for salaries for the staff and the maintenance of the building during the first year.

These recommendations have been accepted by the Reconstruction and Development Committee of the Cabinet and it is hoped that final action will be taken on the recommendations within the next few months.

It is also proposed, should the recommendations regarding the National Research Institute be accepted, that an Associate Advisory Committee be constituted of representatives of the Canadian Technical Societies, the Manufacturers' Association, the Scientific Staffs of the Universities and of the Agricultural and Labour interests, whose function it will be to review the work of the Institute and report annually to the governing body such recommendations the adoption of which, in its opinion, will enhance the usefulness and service of the Institute to the Dominion. This will bring to bear on the work of the Institute forces which will prevent waste of efforts, slackness and other defects which might develop in its work or organization. It will also keep the governing body and the staff in direct touch with the opinion of the sections of the public most vitally interested in its success.

If the recommendations of the Research Council are accepted at once, not only an organization but a policy will be inaugurated which will place Canada in the front rank of those States which are trying to prepare for the strenuous international industrial struggle that is soon to begin. The results of this policy will be far reaching, not only on the industries but also in stimulating scientific research in our universities and in promoting the best interests of the technical professions of Canada.
